



Griffy Lake
Aquatic Vegetation Management Plan
Update

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Executive Summary

This report was created in order to update the Griffy Lake Aquatic Vegetation Management Plan (AVMP). The update serves as a tool to track changes in the vegetation community and make the necessary adjustments to the vegetation management action plan. Items covered include the 2005 and 2006 sampling results, a review of the 2006 vegetation controls, and updates to the budget and action plans. The original Griffy Lake AVMP was completed in 2004 in response to the discovery of Brazilian elodea (*Egeria densa*). The goal of the original plan was the elimination of Brazilian elodea. This was the first public access lake in Indiana to contain this invasive species, so eradication of this species was a priority. Aquatic Control completed a survey in 2004 and found Brazilian elodea at 32.3% of sample sites. The nuisance exotic species Eurasian watermilfoil (*Myriophyllum spicatum*) and curlyleaf pondweed (*Potamogeton crispus*) were also found to be abundant in Griffy Lake. The Indiana Department of Natural Resources (IDNR) conducted a survey in 2005 that indicated that Brazilian elodea was continuing to spread throughout the lake. IDNR funded a whole lake fluridone treatment in 2006 as part of the original plan's recommendations. Aquatic Control Inc. completed the initial treatment on April 20, 2006. Five more bump treatments were completed throughout the growing season in an effort to maintain an effective fluridone concentration. These treatments significantly reduced Brazilian elodea abundance to the point that no rooted Brazilian elodea was observed at any point in the 2006 season. However, Brazilian elodea stems were collected during late summer rake sampling. Due to the presence of these stems, and the importance of eradicating this species, it is recommended that a whole lake fluridone treatment be completed in 2007.

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INTRODUCTION

This report was created in order to update the Griffy Lake Aquatic Vegetation Management Plan. The plan update was funded by the Indiana Department of Natural Resources. The update serves as a tool to track changes in the vegetation community and make the necessary adjustments to the vegetation management action plan. Items covered include the 2005 and 2006 sampling results, a review of the 2006 vegetation controls, and updates to the budget and action plans. Once reviewed and approved, the update should be included in the original vegetation management plan, following the reference section and prior to the appendix.

SAMPLING RESULTS

2005 Sampling Results

District fisheries biologists from the Department of Natural Resources completed plant sampling in 2005. Sampling took place on July 11 and consisted of a Tier II survey. Prior to surveying, a Secchi measurement was taken and found to be 7.5 feet. Seventy-two sites were sampled and 68 of those sites had plants. A total of 11 species were identified. Coontail was the most abundant species collected (72.6% of sites), followed by Eurasian watermilfoil (69.9%), Brazilian elodea (49.3%), and brittle naiad (17.8%). Common naiad, curlyleaf pondweed, American pondweed, Chara, creeping water primrose, sago pondweed, and small pondweed were also collected at a lower percent occurrence (Table 1). Location and density of Brazilian elodea is illustrated in Figure 1.

Table 1. Griffy Lake, Occurrence and Abundance of Submersed Aquatic Plants, July 11, 2005.

Occurrence and Abundance of Submersed Aquatic Plants							
Date:	7/11/05	Littoral sites with plants:	68	Species diversity:	0.81		
Littoral depth (ft):	18.0	Number of species:	11	Native diversity:	0.64		
Littoral sites:	72	Maximum species/site:	8	Rake diversity:	0.75		
Total sites:	78	Mean number species/site:	2.69	Native rake diversity:	0.46		
Secchi:	7.5	Mean native species/site:	1.32	*Mean rake score:	1.73		
Common Name	Site frequency	Relative density	Mean density	Dominance			
Coontail	72.6	2.19	3.02	44.4			
Eurasian Watermilfoil	69.9	1.45	2.08	29.4			
Brazilian Elodea	49.3	1.26	2.56	25.6			
Brittle Naiad	17.8	0.25	1.38	5.0			
Curly-leaf Pondweed	16.4	0.16	1.00	3.3			
Bushy Naiad	15.1	0.22	1.45	4.4			
Sago Pondweed	8.2	0.14	1.67	2.8			
Small Pondweed	8.2	0.10	1.17	1.9			
Chara	2.7	0.08	3.00	1.7			
American Pondweed	2.7	0.04	1.50	0.8			
Creeping Water Primrose	1.4	0.01	1.00	0.3			



Figure 1. Griffy Lake, location and density of Brazilian elodea, July 11, 2005.

2006 Sampling Results

A whole lake fluridone treatment was initiated on April 20, 2006 so there was no official spring sampling. Unofficial visual surveys were completed throughout the spring and summer in order to document the effects of the treatment on Brazilian elodea. Brazilian elodea was never observed rooted and actively growing during the 2006 season. However, Brazilian elodea stems were found throughout the season using a double-sided rake (rake is described in detail in the original plan). It appeared that the stems were lying parallel to the lake bottom since they were never observed from the surface.

Aquatic Control completed tier I and tier II surveys on August 8, 2006. These surveys were completed in order to document changes in the plant community caused by the on-going whole lake fluridone treatment and to assist in planning for the 2007 season. Secchi measurements were taken prior to the survey and found to be 5.5 feet. A dissolved oxygen and temperature profile was also completed. The profile found oxygen levels above 5.0 mg/l to a depth of 14.0 feet. Temperatures ranged from 84.1 degree Fahrenheit on the surface to 52.5 degrees on the bottom.

Tier I Survey Results

On August 8, 2006 a tier I survey was completed on Griffy Lake. The tier I survey revealed 16 distinct plant beds within Griffy Lake totaling 42.5 acres. (Table 2 & Figure 2). Vegetation was present to a maximum depth of 18 feet. Eight different species were observed.

Table 2. Griffy Lake Tier I Survey Results, August 8, 2006.

Lake Name: Griffy		Number of plant beds: 16				Littoral zone max depth: 18 ft										
Date: 8/8/06		Number of species: 8														
Secchi: 5.5 ft		Littoral zone size: 42.5 acres														
Plant Bed I.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Plant Bed Size (acres)	0.1	9.9	0.2	2.2	14.6	1.1	1.8	1.3	0.1	1.1	4.8	0.1	0.5	0.9	2.2	1.2
Creeping water primrose	4	1	-	-	-	1	1	1	1	1	2	-	4	-	-	-
Chara	2	4	-	2	3	-	4	1	3	4	2	2	1	4	1	1
Star duckweed		1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Common cattail	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Swamp rose mallow	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
American water willow	-	-	1	-	1	-	2	-	1	1	2	3	2	1	1	-
Common coontail	-	-	-	4	2	4	1	-	-	1	2	1	-	-	1	1
Brazilian elodea	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	1

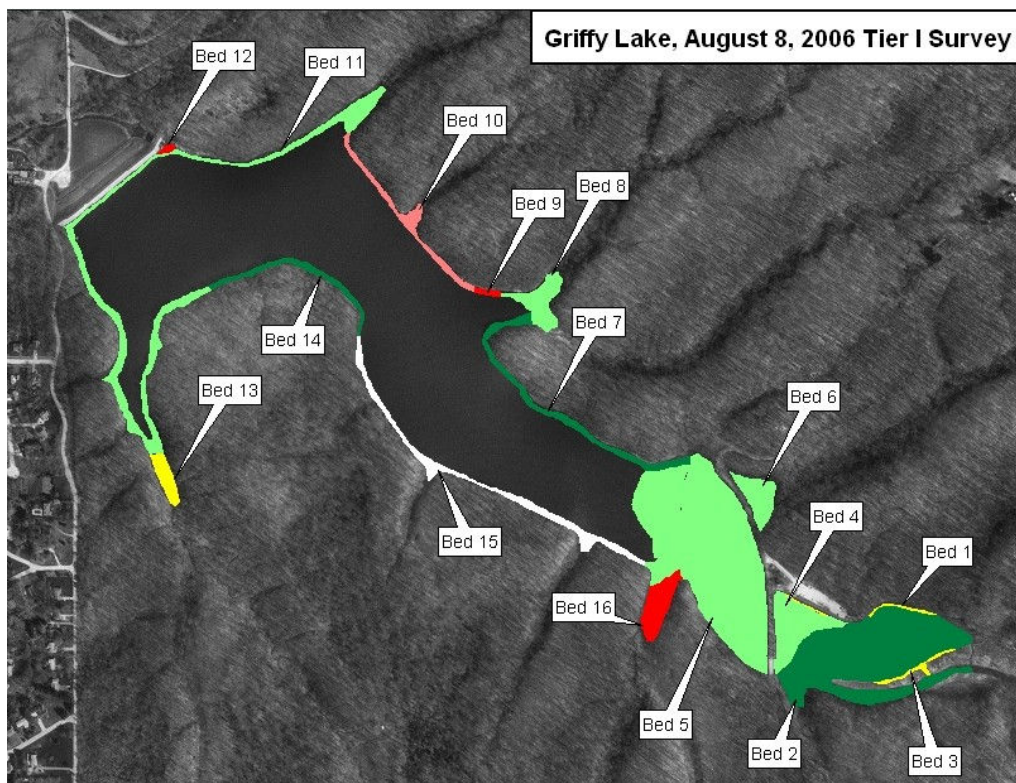


Figure 2. Tier I plant beds, Griffy Lake, August 8, 2006. Brazilian elodea was found in those beds shaded red.

Rooted floating and emergent vegetation dominated plant beds 1, 3, and 13. These beds totaled 0.9 acres and were comprised of creeping water primrose (*Jussiaea repens*), common cattail (*Typha latifolia*), American water willow (*Dianthera americana*), and swamp rose mallow (*Hibiscus palustris*). Chara (*Chara spp.*) and common coontail (*Ceratophyllum demersum*) were the only submersed species found in these three beds.

Plant bed 2 was located in the upper end of Griffy Lake near the boat ramp. This area was estimated to be 9.9 acres. Chara was the dominant species in bed 2. Creeping water primrose and star duckweed (*Lemna trisulca*) were also observed at a much lower abundance.

Plant beds 4, 5, and 6 were all located in the upper end of Griffy Lake and had similar composition. Bed 4 included the area near the boat ramp and was estimated to be 2.2 acres. Common coontail was the most abundant species in this bed. Chara was also observed. Bed 5 included an area just west of the causeway and was 14.6 acres. Chara was more abundant than coontail in bed 5. American water willow was also documented in this area. Bed 6 included the small pond that is connected to Griffy Lake and just east of bed 5. This bed totaled 1.1 acres and was comprised mainly of coontail.

Plant bed 7 included a 1.8-acre area along the north-shore of Griffy Lake. Chara dominated plant bed 7 and was at or near the surface. American water willow, creeping water primrose, and common coontail were also observed.

Plant bed 8 included the shallow area of the first cove on the north side of Griffy Lake. The area was estimated to be 1.3 acres. Creeping water primrose and Chara were observed in this area but at a very low density.

Plant beds 9, 12, and 16 were the only beds in which Brazilian elodea was observed. These beds were estimated to be 1.4 acres in area. Bed 9 was located between beds 8 and 10 near the first cove on the north side of the lake. This area was determined to be approximately 0.1 acres. Chara was the most abundant species in bed 9. Creeping water primrose, water willow, and Brazilian elodea were also present a lower abundance ratings. Bed 12 was located near the overflow and was found to be 0.1 acres. American water willow was the most abundant species in bed 12. Chara, common coontail, and Brazilian elodea were also observed. Bed 16 was the largest bed in which Brazilian elodea was observed. Bed 16 encompassed an area of 1.2 acres. Brazilian elodea, common coontail, and Chara were all observed in this bed at a low abundance. Brazilian elodea in these areas appeared to have been damaged from the sonar treatment. The stems were black in appearance and contained no roots (Figure 3). It was not clear whether it would recover from this damage.



Figure 3. Brazilian elodea stem after treatment (photo taken May 11, 2006).

Beds 10, 11, and 14 included an area of 6.8 acres. These beds were all similar in composition. Chara, creeping water primrose, common coontail, and American water willow were present in all three beds at slightly different densities.

Plant bed 15 was located along the steep slopes of the south bank. This bed included an area that measured an estimated 2.2 acres. Chara, water willow, and coontail were all observed in this area but at low densities.

Tier II Survey Results

Tier II sampling took place immediately following the tier I survey. Table 3 outlines the survey results. A total of 50 sites were surveyed throughout the littoral zone of the lake. Eighteen sites were located between 0-5 feet, sixteen sites from 5-10 feet, sixteen sites between 10-15 feet, and ten sites from 15-20 feet. Maximum plant depth was determined to be 18 feet. Plants were present at 22 of the sample sites. A total of four species were sampled, all of which were native except Brazilian elodea. The maximum number of species collected at a site was 3. The overall location and density of aquatic vegetation is illustrated in Figure 4.

Table 3. Griffy Lake Tier II survey results, August 8, 2006.

Occurrence and abundance of submersed aquatic plants in Griffy Lake						
County: Monroe		Sites with plants: 22		Mean species/site: 0.60		
Date: 8/8/2006		Sites with native plants: 21		Standard error (ms/s): 0.11		
Secchi (ft): 5.5		Number of species: 4		Mean native species/site: 0.50		
Maximum plant depth (ft): 18		Number of native species: 3		Standard error (mns/s): 0.09		
Trophic status Mesotrophic		Maximum species/site: 3		Species diversity: 0.57		
Total sites: 50		Native species diversity: 0.43				
All depths (0 to 20 ft)	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
Ceratophyllum demersum	38.0	62.0	34.0	4.0	0.0	9.2
Chara spp.	10.0	90.0	6.0	4.0	0.0	2.8
Egeria densa	10.0	90.0	10.0	0.0	0.0	2.0
Zannichellia palustris	2.0	98.0	0.0	2.0	0.0	0.4
Depth: 0 to 5 ft	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
Ceratophyllum demersum	21.4	78.6	14.3	7.1	0.0	7.1
Chara spp.	28.6	71.4	14.3	14.3	0.0	8.6
Depth: 5 to 10 ft	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
Ceratophyllum demersum	57.1	42.9	50.0	7.1	0.0	14.3
Egeria densa	21.4	78.6	21.4	0.0	0.0	4.3
Zannichellia palustris	7.1	92.9	0.0	7.1	0.0	1.4
Depth: 10 to 15 ft	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
Ceratophyllum demersum	50.0	50.0	50.0	0.0	0.0	10.0
Chara spp.	8.3	91.7	8.3	0.0	0.0	1.7
Egeria densa	16.7	83.3	16.7	0.0	0.0	3.3
Depth: 15 to 20 ft	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
Ceratophyllum demersum	20.0	80.0	20.0	0.0	0.0	4.0

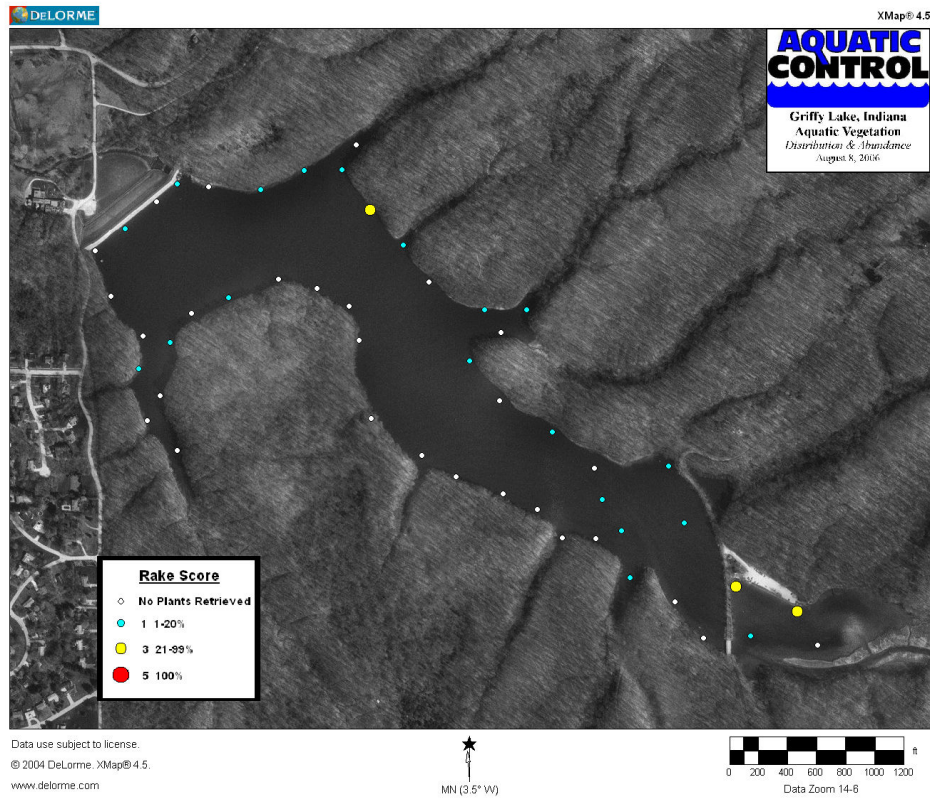


Figure 4. Griffy Lake aquatic vegetation distribution and abundance, August 8, 2006.

Of the four species collected, common coontail had the highest frequency of occurrence (38%). Location and density of this species is illustrated in Figure 5. Chara and Brazilian elodea were both found at 10% of the sampling sites (Figure 6 & 7). Horned pondweed (*Zanichellia palustris*) was found at only a single sample site (Figure 8).

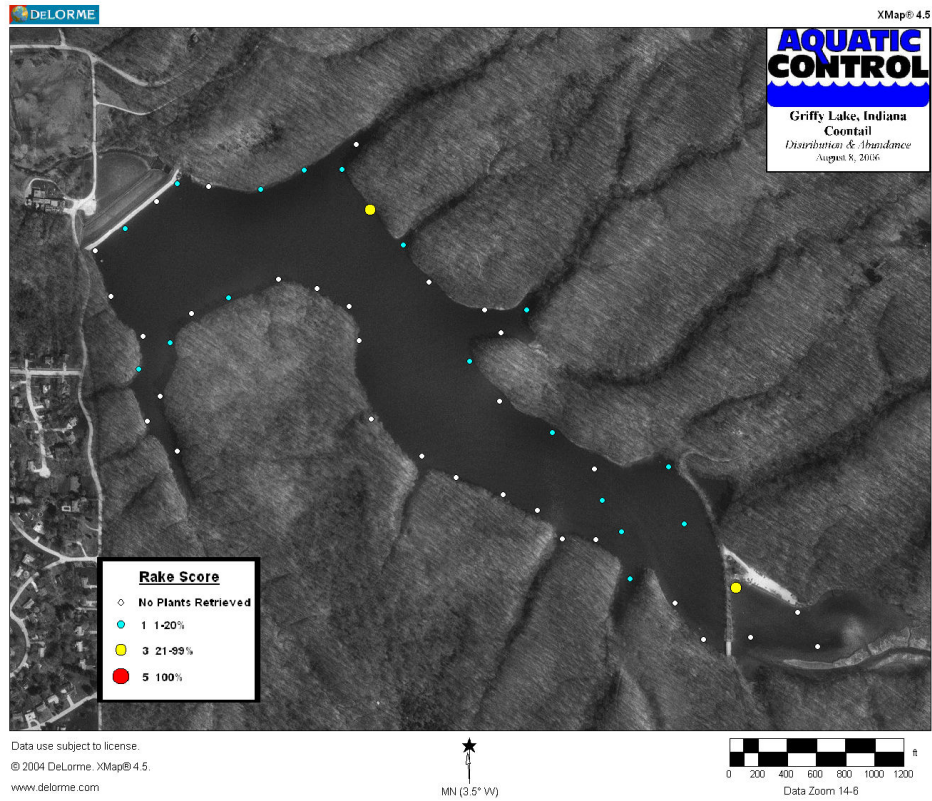


Figure 5. Griffy Lake, common coontail distribution and abundance, August 8, 2006.

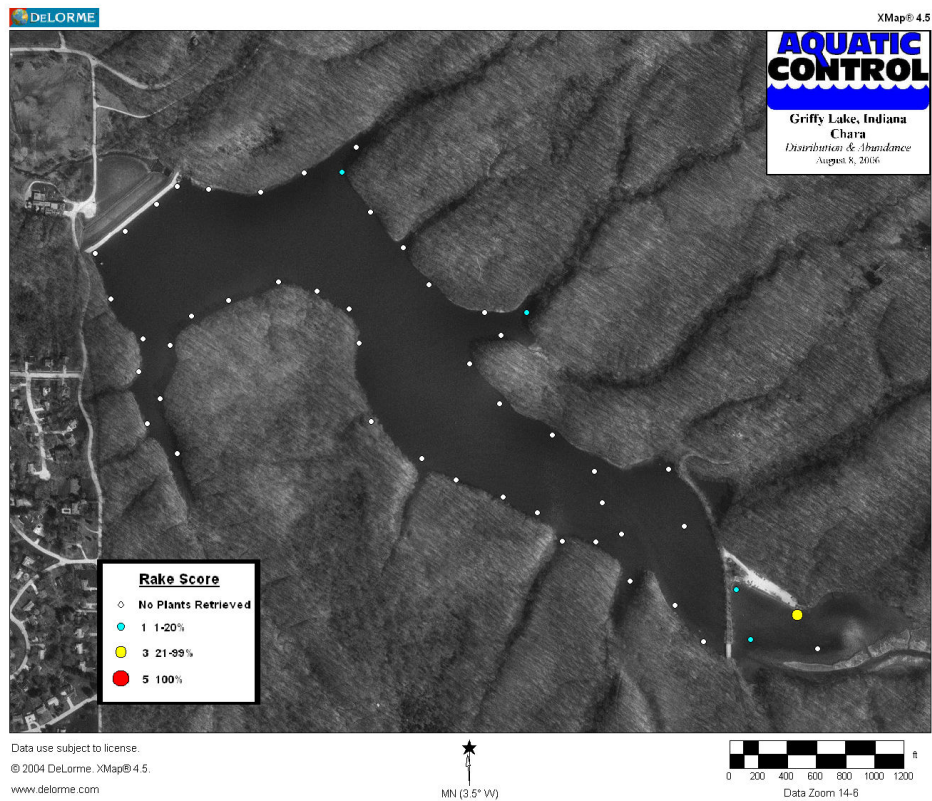


Figure 6. Griffy Lake, Chara distribution and abundance, August 8, 2006.

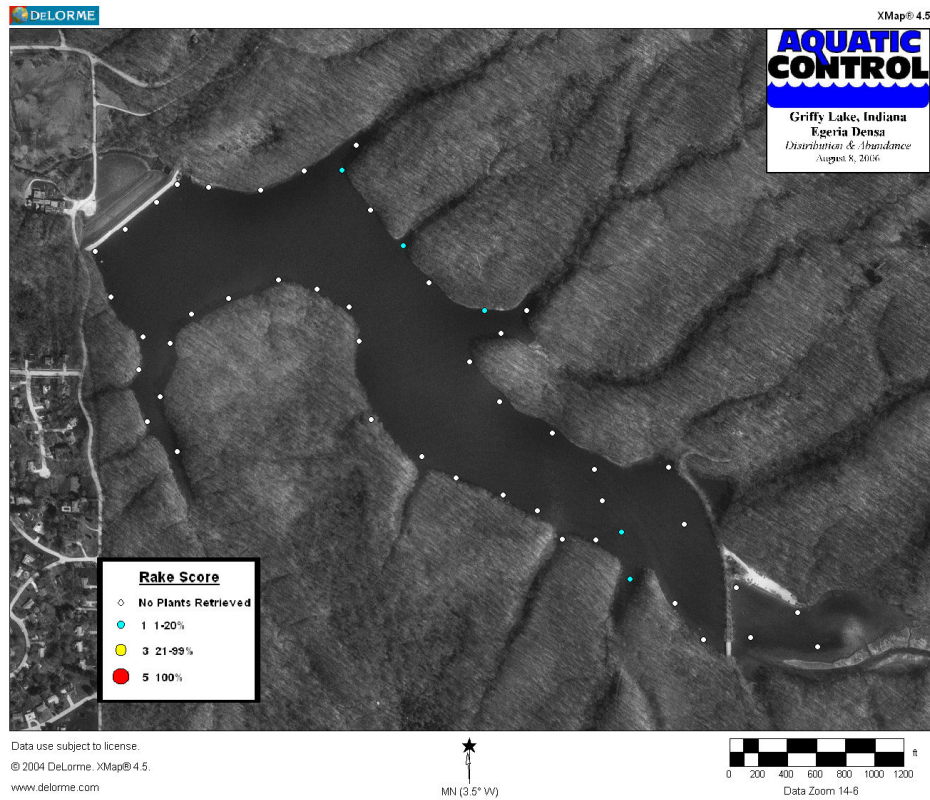


Figure 7. Griffy Lake, Brazilian elodea distribution and abundance, August 8, 2006.

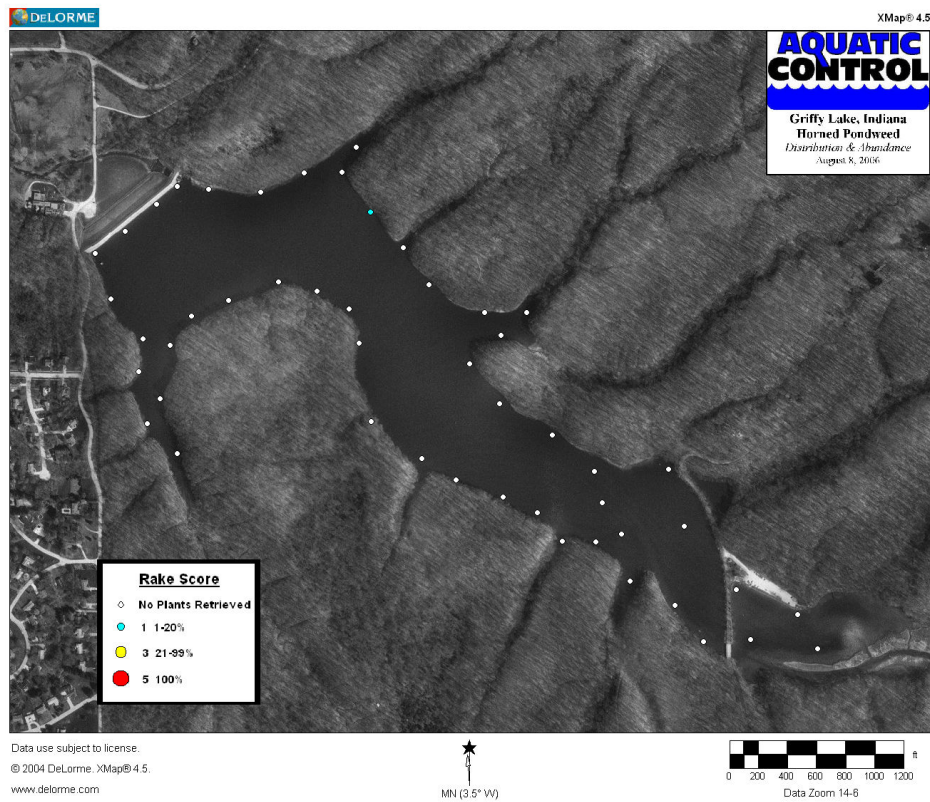


Figure 8. Griffy Lake, horned pondweed distribution and abundance, August 8, 2006.

Aquatic Vegetation Sampling Discussion

The primary goal of the vegetation management plan is the eradication of Brazilian elodea. In order to meet this goal, a whole lake fluridone treatment was completed in 2006. Brazilian elodea was significantly reduced by the time the August survey was completed, however, there was still some plant material sampled (Figure 9). These plants were damaged and may not have survived, but they were included in the sample since they were identifiable. It was later determined that the plants likely had a 50% chance of survival and that another bump treatment should be completed (this will be discussed further in the treatment section). An informal survey of areas of concern was completed on October 31 and no Brazilian elodea plants were detected.

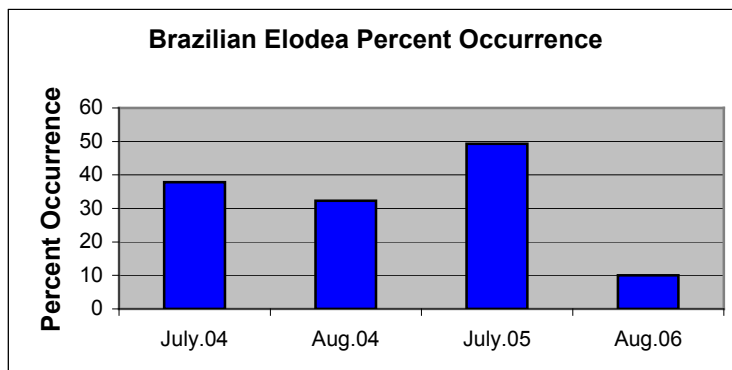


Figure 9. Griffy Lake, Brazilian elodea percent occurrence in the last four surveys (July 2004 and July 2005 data collected by IDNR).

From the outset of this treatment it was clear that there would be damage to the native plant population due to the need to use high rates of fluridone over an extended period of time. There was a reduction in plant diversity when compared to past surveys (Figure 10).

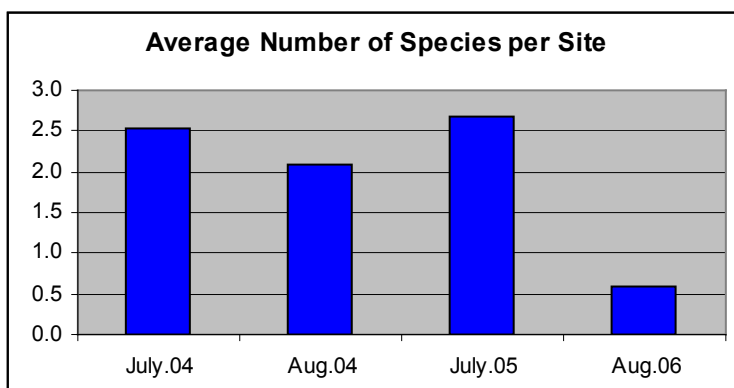


Figure 10. Griffy Lake, average number of species collected per site in the last four surveys (July 2004 and July 2005 data collected by IDNR).

Common coontail was one of the most abundant submersed plant species prior to the fluridone treatment. This species is susceptible to fluridone at low to moderate rates over extended times. Coontail was damaged by the treatment, but was still the most abundant species present in the August sampling (Figure 11).

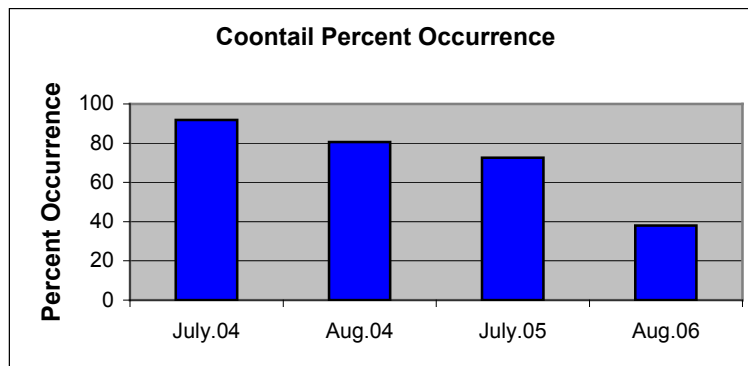


Figure 11. Griffy Lake, common coontail percent occurrence in the last four surveys (July 2004 and July 2005 data collected by IDNR).

Brazilian elodea was not the only invasive exotic species found during previous sampling. Eurasian watermilfoil was also abundant prior to the fluridone application. This species is very susceptible to fluridone at low rates and was not discovered during the August 2006 sampling (Figure 12). However, there were fragments of this plant observed following a heavy rain event. It appears possible that this plant is present within the Griffy Lake watershed. Efforts are underway in an attempt to discover the location of the milfoil. Curlyleaf pondweed is another invasive exotic species in Griffy Lake. This plant was damaged by the treatment but will likely return next season due to the presence of reproductive structures called turions (curlyleaf pondweed turions are not affected by fluridone and can remain viable in the bottom sediments for several years).

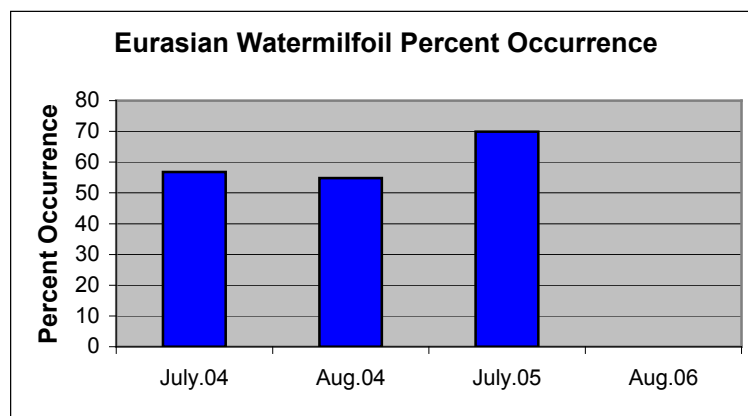


Figure 12. Griffy Lake, Eurasian watermilfoil percent occurrence in the last four surveys (July 2004 and July 2005 data collected by IDNR).

One of the main concerns prior to the fluridone treatment was that once the plants were removed, Griffy Lake would revert to a bluegreen algae dominated lake. This did not occur. There was an instance of filamentous algae growing in the upper end of the lake in late spring, but this disappeared by summer (Figure 13). Secchi measurements taken in the last three plant surveys and on five occasions in 2007. These measurements are graphically illustrated in Figure 14. Secchi measurements can be highly variable due to many environmental factors, but it appears that there was not a dramatic shift in water clarity following the treatment.



Figure 13. Photo taken on July 6, 2006 from the public access site in the upper end of Griffy Lake. Note lack of filamentous algae, which was observed earlier in the spring.

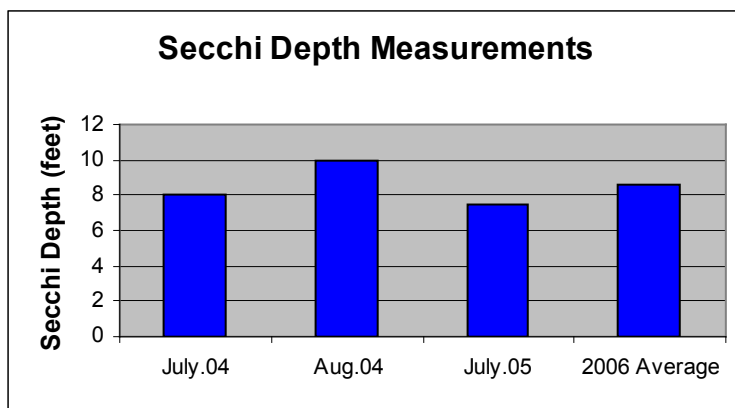


Figure 14. Griffy Lake, Secchi measurements from the last three seasons (July 2004 and July 2005 data collected by IDNR, 2006 average calculated from five measurements taken by Aquatic Control on May 1, May 11, June 15, July 7, and August 8).

2006 VEGETATION CONTROL

In late 2005, IDNR made the decision to complete a whole lake fluridone treatment on Griffy Lake. Aquatic Control Inc. won the bid to complete the treatment. The goal of the treatment was to eradicate Brazilian elodea with the use of fluridone. Initial conversations with plant managers and university personnel pointed towards keeping a concentration of fluridone at or above 6 ppb for 120 consecutive days. A PlanTest was

completed by SePro personnel that showed maintaining a concentration of between 6-9 ppb would effectively control Brazilian elodea. After discussions with IDNR, SePro Corporation, and Aquatic Control, the fluridone treatment prescription was to maintain 12 ppb of fluridone for a period of 60 consecutive days. It was believed that a higher concentration for a shorter period of time would be as effective as the lower concentration for a longer period of time but more cost effective to maintain. Sonar AS, Q, and PR were the three Sonar formulations selected this treatment. Sonar AS is a liquid formulation that provides an immediate release of fluridone. The one drawback to using this formulation is the potential of losing the product due to flow. Sonar Q is a granular formulation that releases fluridone slower than AS but faster than PR. Sonar PR is also a granular formulation that releases fluridone slower than Sonar Q.

The initial treatment was originally scheduled for April 17. However, due to heavy rains, this treatment was completed on April 20. A total of 1480 pounds or a theoretical concentration of 25 parts per billion (ppb) of Sonar Q was applied on April 20 (Figure 15 and Table 4). Three FasTests, designed to monitor fluridone levels, were taken on May 1 (Figure 16). On May 11, a bump treatment was completed with 460 pounds or 8 ppb of Sonar Q and PR. On May 16 another bump was completed using Sonar Q and PR. A total of 300 pounds or 5 ppb was applied at this time. Due to heavier than expected rains it was determined that another bump treatment would be required. This treatment was completed on June 15 with Sonar AS. A total of 4 gallons or 5.5 ppb was applied. One more bump was completed on July 6 with 80 pounds or 1.5 ppb of Q. This product was applied to all three areas that still contained Brazilian elodea. Following the August survey, SePRO was contacted and asked to send out their specialist in order to determine if another bump was necessary. Dr. Tyler Koschnick and Bob Johnson inspected the lake on September 12. Dr. Koschnick estimated that the remaining few patches of Brazilian elodea had a 50/50 chance at surviving into next season. He recommended that another bump treatment be completed as soon as possible. The reasoning was that the remaining Brazilian elodea was already severely damaged and one more bump would likely finish it off. The last bump treatment was completed on September 19 with 10.5 gallons or 14.5 ppb of Avast! Herbicide (fluridone is also the active ingredient in Avast!). A summary of the treatments is illustrated in Table 4 and a summary of the FasTest results is illustrated in Figure 16.

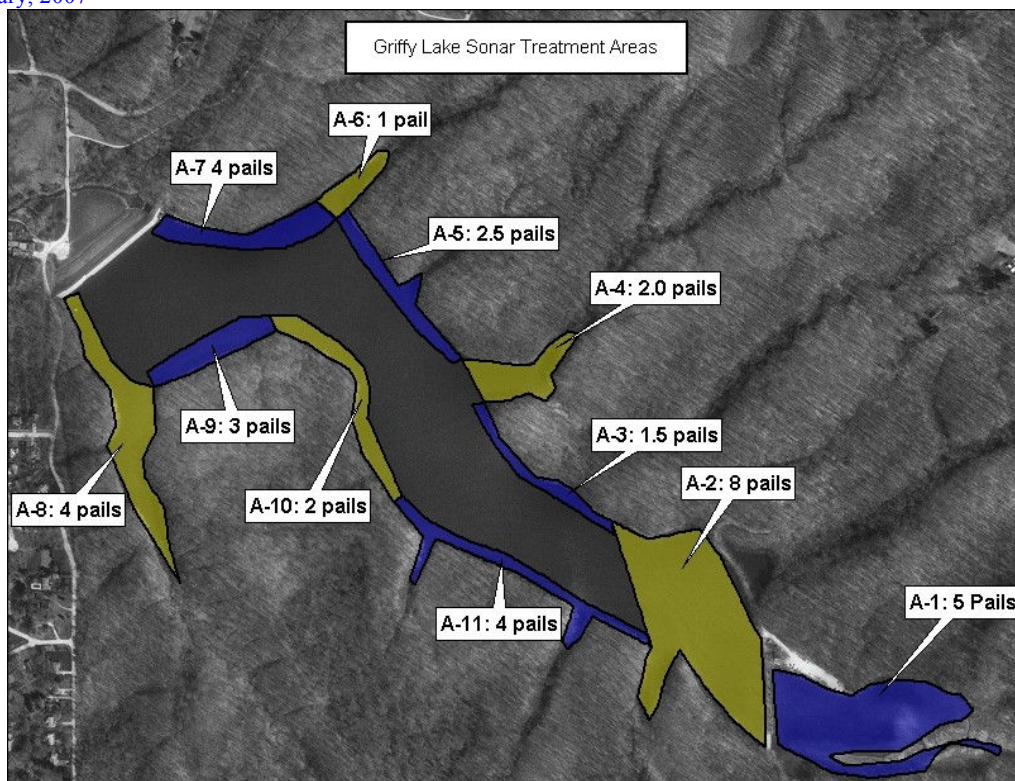


Figure 15. Initial sonar treatment areas on Griffy Lake, April 20, 2006.

Table 4. Summary of the 2006 Griffy Lake Treatment.

Date	Product	Amount Applied	Treatment Area	Concentration
April 20, 2006	Sonar Q	1480 Pounds	Whole Littoral Zone	25 ppb
May 11, 2006	Sonar Q and PR	460 Pounds	Upper end and coves	8 ppb
May 16, 2006	Sonar Q and PR	300 Pounds	Upper end and coves	5 ppb
June 15, 2006	Sonar AS	4 Gallons	Upper end and coves	5.5 ppb
July 6, 2006	Sonar Q	80 Pounds	Problem Bays	1.5 ppb
September 19, 2006	Avast!	10.5 Gallons	Whole Littoral Zone	14.5 ppb

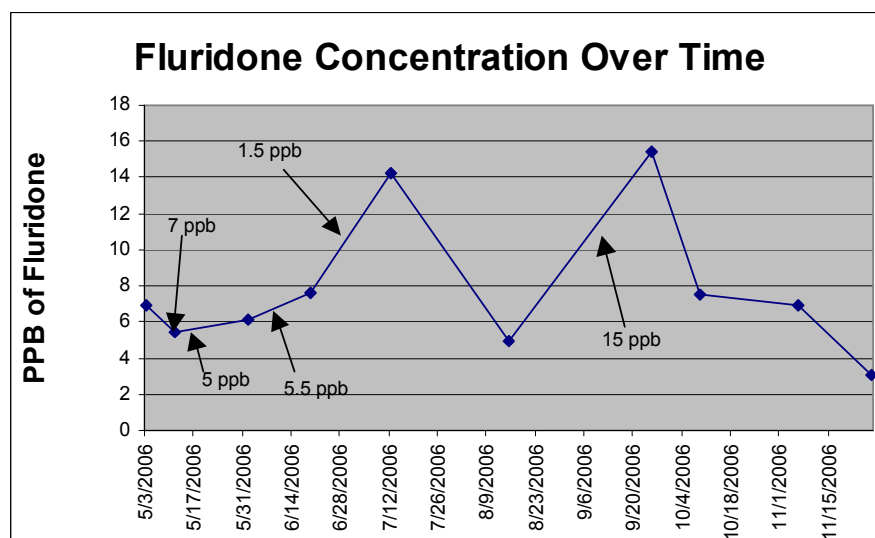


Figure 16. Fluridone concentration in Griffy Lake in 2006, based on FasTest results. Bump treatments of herbicide are shown by arrows and correspond to Table 4.

It does not appear that a 12 ppb average concentration was ever maintained for 60 consecutive days (there may have been a total of 60 days over 12 ppb, but not consecutively). However, it appears that 6 ppb of fluridone was present in Griffy lake for over 180 consecutive days. According to some researchers, long exposures to fluridone at lower rates may be more effective than short exposures to higher rates. Long exposures at low rates are typically more difficult to achieve due to dilution, so most applicators are hesitant to attempt this type of treatment. Despite the use of formulations designed for slower release of fluridone, the initial concentration never reached the predicted levels due to heavy spring rainfall. Figure 17 is a picture of the overflow of Griffy Lake, shortly after the initial treatment.



Figure 17. Overflow of Griffy Lake, May 11, 2006.

Figuring the amount of fluridone that will be lost is one of the most difficult aspects of a whole lake fluridone treatment (fluridone requires much longer contact time than traditional aquatic herbicides so heavy flows can reduce fluridone levels). Bump treatments were completed in order to overcome the spring rains. Several weeks following the September bump treatment the lake was informally sampled. The three bays that contained Brazilian elodea stems in the August survey were explored during November 6 and 27 FasTest sampling. Ten to fifteen rake tosses were made in each of these three bays. On November 6, no Brazilian elodea stems were detected. However, on November 27, one black stem was retrieved from the first bay on the left heading from the causeway to the dam.

ACTION PLAN AND BUDGET UPDATE

Despite the loss of product from a wet spring and summer, the whole lake treatment of Griffy Lake was successful. Following the treatments, Eurasian watermilfoil, curlyleaf pondweed, and Brazilian elodea were no longer a nuisance to fishermen and lake users (Figure 18). There was very little Brazilian elodea remaining by the August survey. That which was present appeared to be damaged from the treatment. In addition, the final application was made in September to be certain that the damaged plants did not survive and only a single black stem was discovered in subsequent informal sampling.



Figure 18. Photo taken of Griffy Lake on August 20, 2004 compared to photo taken of same area on July 6, 2006.

It is difficult to predict how much, if any, Brazilian elodea will return next season. This makes deciding on an action plan difficult, but there are several options for dealing with Brazilian elodea that must be considered. Potential control options are as follows: whole lake fluridone treatment, aggressive Brazilian elodea detection program, spot treatment following detection, whole lake treatment following detection. These options are discussed in detail below along with options for dealing with curlyleaf pondweed and Eurasian watermilfoil if a whole lake treatment is not completed.

Whole Lake Fluridone

If funding of another whole lake fluridone treatment is feasible and if eradication of Brazilian elodea is a priority for IDNR, then another whole lake fluridone treatment should be initiated next spring. The most difficult aspect of eradicating Brazilian elodea will be detection of any remaining plants. Even under the most intense sampling it is still possible that some individual plants would escape detection. Whole lake fluridone treatments do not rely on detecting individual plants that may be scattered throughout the littoral zone. If there are remaining plants they will likely have limited carbohydrate reserves thanks to last season's treatment and would have a very low chance of surviving another season of a whole lake fluridone treatment. The fluridone treatment should consist of maintaining at least 5 ppb for a minimum of 120 days. The initial herbicide application should be made in early to mid May to avoid some of the heavy spring rain events and dilution of the chemical. If the whole lake fluridone treatment is initiated next season, then plant sampling should be completed in August of 2007. Only a Tier II

aquatic vegetation survey will be conducted, however sampling locations will increase from 50 to 100 points. A tier I vegetation survey will not be performed. The estimated cost for this treatment and sampling could range from \$70,000-\$80,000.

Aggressive Brazilian Elodea Detection Program

If a whole lake fluridone treatment is not feasible next season due to limited funds, then detection of Brazilian elodea will be the most important and probably the most difficult action. Intensive vegetation sampling will need to take place. This sampling should take place in late April and be more intense than past sampling. A minimum of 200 points throughout the littoral zone should be sampled with a modified tier II survey method (this will include one rake pull for every 0.2 acres of littoral zone). If Brazilian elodea is not detected in the initial 2007 spring sampling then treatment may not be necessary. However, it will be important to continue sampling throughout the 2007 season. This sampling should include two additional tier II surveys with 200 points sampled each survey. The two additional surveys should be completed in mid June and early August. If Brazilian elodea is detected in one of the later surveys then one of the following plant management actions should be initiated. The estimated cost for the intensive sampling would be \$15,000-\$20,000.

Spot Treatment Following Detection

If Brazilian elodea is detected in a single area less than 1 acre in size, that area should be treated with 150 ppb of Sonar PR in a 5 acre area around the detection location. This area should be sampled again within 12 weeks of treatment. A minimum of 20 rake tosses along with a visual inspection of the area will suffice for sampling. If any plants remain, the treatment should be repeated as soon as possible. In addition to the treatments, sampling should continue in the same fashion as discussed in the previous section. The estimated cost for this type of treatment along with the sampling described in the previous paragraph would be \$25,000-\$30,000.

Whole Lake Treatment Following Detection

Ideally, another whole lake fluridone treatment should be initiated next spring for eradication of Brazilian elodea. If IDNR chooses to hold off on the whole lake treatment and Brazilian elodea is detected during the spring sampling in multiple areas or in locations greater than 1-acre, then the whole lake treatment should be initiated immediately. The reasoning is that if the plant is observed in a single large area or in a couple of areas, it is probably in more locations that were not detected.

Curlyleaf Pondweed Control

If a whole lake fluridone treatment is not completed in 2007, curlyleaf pondweed will be the primary nuisance exotic species. The main goal of the action plan is to eradicate Brazilian elodea, but it may be in the best interests of the Bloomington Parks Department to control curlyleaf pondweed. This species can be controlled with low doses of Aquathol K (active ingredient endothal) herbicide. These low dose treatments are designed to control curlyleaf pondweed and not harm native species (curlyleaf pondweed is susceptible to endothal rates as low as 0.5 ppm while most natives can tolerate this level). Curlyleaf pondweed treatments should be completed in early spring prior to turion production and before native species begin actively growing. Three to four years of

treatment will be needed to exhaust the curlyleaf pondweed turion supply. The cost of such a treatment would run between \$6,000-\$10,000 each season.

Eurasian Watermilfoil Control

Eurasian watermilfoil was not detected in the summer tier II survey, however fragments were observed floating on the surface after a heavy rain late in the season. This species is likely located somewhere in the watershed. The Bloomington Parks Department has been notified of the potential of reinfestation from upstream locations and is investigating potential sources of Eurasian watermilfoil. If this species is discovered upstream steps should be taken to control it in those waterbodies. Since fragments were detected in the summer of 2006, some milfoil may become established in 2007. If a whole lake treatment is not completed in 2007, then steps should be taken to control any Eurasian watermilfoil that is detected. The detected plants should be treated as soon as possible with granular 2,4-D or Renovate herbicides.

Appendix Update
2006 Sampling Data
August Tier I Data

Tier 1

Aquatic Vegetation Reconnaissance Sampling

Waterbody Cover Sheet

Surveying Organization:

Aquatic Control

Waterbody Name:

Griffy

Lake ID:

County:

Monroe

Date:

8-8-06

Habitat Stratum:

IR

Ave. Lake

16

Depth (ft):

Lake Level:

Norm

GPS Metadata

Crew

Leader:

N. Long

Wad??

D

3M

Datum:

Zone:

Accuracy:

Recorder:

B. Isaacs

Method:

D

Secchi Depth (ft):

5.5

Total # of Plant

16

Beds Surveyed:

Total # of

Species:

8

Littoral Zone Size (acres):

42.5



Measured



Estimated

Littoral Zone Max. Depth (ft):

18



Measured

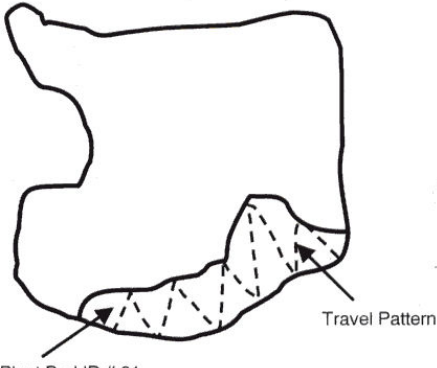


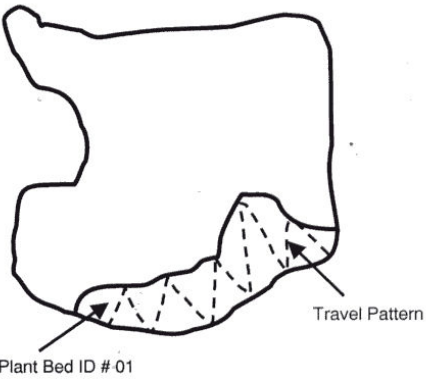
Estimate (historical Secchi)

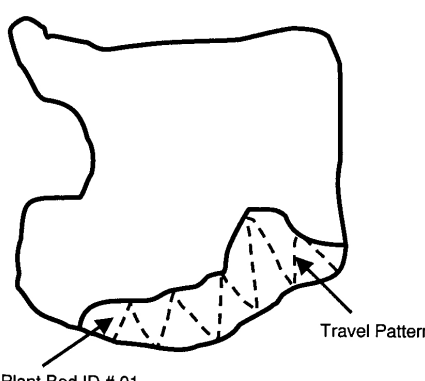


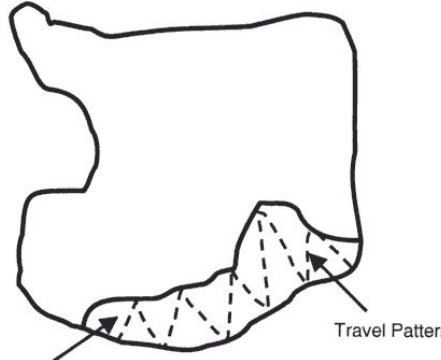
Estimated (current Secchi)

Notable Conditions:

Aquatic Vegetation Plant Bed Data Sheet						Page <u>1</u> of <u>16</u>	
State of Indiana Department of Natural Resources							
ORGANIZATION: <u>Aquatic Control</u>				DATE: <u>8-8-06</u>			
SITE INFORMATION				SITE COORDINATES			
Plant Bed ID: <u>01</u>	Waterbody Name: <u>Griffy</u>			Center of the Bed			
Bed Size: <u>0.1</u>				Latitude: <u>N 39.19781</u>			
Substrate: <u>1</u>	Waterbody ID:			Longitude: <u>W 86.51043</u>			
Marl? <u>0</u>	Total # of Species <u>2</u>			Max. Lakeward Extent of Bed			
High Organic? <u>1</u>	Canopy Abundance at Site				Latitude: <u>N 39.19707</u>		
	S: <u>1</u>	N: <u>1</u>	F: <u>1</u>	E: <u>3</u>	Longitude: <u>W 86.51105</u>		
SPECIES INFORMATION							
Species Code	Abundance	QE	Vchr.	Ref. ID	<div style="text-align: center;">Individual Plant Bed Survey</div> 		
<u>LUPE</u>	<u>4</u>	<u>0</u>	<u>0</u>				
<u>CH?KA</u>	<u>2</u>	<u>2</u>	<u>0</u>		<div style="text-align: center;">Comments:</div> <p style="font-size: 1.2em; margin-top: 20px;"><u>Secchi</u></p> <p style="margin-top: 10px;"><u>D.O./Temp on back</u></p>		
REMINDER INFORMATION							
Substrate:	Marl	Canopy:		QE Code:			Reference ID:
1 = Silt/Clay	1 = Present	1 = < 2%		0 = as defined			Unique number or
2 = Silt w/Sand	0 = absent	2 = 2-20%		1 = Species suscep			letter to denote specific
3 = Sand w/Silt		3 = 21-60%		2 = Genus suspected			location of a species;
4 = Hard Clay	High Organic	4 = > 60%		3 = Unknown			referenced on attached map
5 = Gravel/Rock	1 = Present						
6 = Sand	0 = absent						
Overall Surface Cover		Abundance:		Voucher:			
N = Nonrooted floating		1 = < 2%		0 = Not Taken			
F = Floating, rooted		2 = 2-20%		1 = Taken, not varified			
E = Emergent		3 = 21-60%		2 = Taken, varifier			
S = Submersed		4 = > 60%					

Aquatic Vegetation Plant Bed Data Sheet						Page <u>2</u> of <u>16</u>
State of Indiana Department of Natural Resources						
ORGANIZATION: <u>Aquatic Control</u>				DATE: <u>8-8-06</u>		
SITE INFORMATION				SITE COORDINATES		
Plant Bed ID: <u>2</u>	Waterbody Name: <u>Griffy</u>			Center of the Bed		
Bed Size: <u>9.9</u>				Latitude: <u>N39.1970W</u>		
Substrate: <u>1</u>	Waterbody ID:			Longitude: <u>W86.51105</u>		
Marl? <u>0</u>	Total # of Species			Max. Lakeward Extent of Bed		
High Organic? <u>1</u>	Canopy Abundance at Site			Latitude: <u>N39.19670</u>		
S: <u>1</u> N: <u>1</u> F: <u>1</u> E: <u>1</u>				Longitude: <u>W86.51309</u>		
SPECIES INFORMATION						
Species Code	Abundance	QE	Vchr.	Ref. ID	<div style="text-align: center;">Individual Plant Bed Survey</div> 	
<u>CH2RA</u>	<u>4</u>	<u>0</u>	<u>0</u>			
<u>LUPE</u>	<u>1</u>	<u>0</u>	<u>0</u>			
<u>LETR</u>	<u>1</u>	<u>0</u>	<u>0</u>			
Comments:						
REMINDER INFORMATION						
Substrate:	Marl	Canopy:		QE Code:	Reference ID:	
1 = Silt/Clay	1 = Present	1 = < 2%		0 = as defined	Unique number or	
2 = Silt w/Sand	0 = absent	2 = 2-20%		1 = Species suspected	letter to denote specific	
3 = Sand w/Silt		3 = 21-60%		2 = Genus suspected	location of a species;	
4 = Hard Clay	High Organic	4 = > 60%		3 = Unknown	referenced on attached map	
5 = Gravel/Rock	1 = Present					
6 = Sand	0 = absent					
Overall Surface Cover		Abundance:		Voucher:		
N = Nonrooted floating		1 = < 2%		0 = Not Taken		
F = Floating, rooted		2 = 2-20%		1 = Taken, not varified		
E = Emergent		3 = 21-60%		2 = Taken, varified		
S = Submersed		4 = > 60%				

Aquatic Vegetation Plant Bed Data Sheet						Page 23 of 14
State of Indiana Department of Natural Resources						
ORGANIZATION: <u>Aquatic Control</u>				DATE: <u>8-8-06</u>		
SITE INFORMATION				SITE COORDINATES		
Plant Bed ID: <u>3</u>		Waterbody Name: <u>Griffy</u>		Center of the Bed		
Bed Size: <u>0.2</u>		Waterbody ID:		Latitude: <u>N 39.19678</u>		
Substrate: <u>1</u>		Total # of Species <u>3</u>		Longitude: <u>W 86.51008</u>		
Marl? <u>0</u>		Canopy Abundance at Site		Max. Lakeward Extent of Bed		
High Organic? <u>1</u>		S: <u>1</u> N: <u>1</u> F: <u>1</u> E: <u>4</u>		Latitude: <u>N 39.19659</u>		
				Longitude: <u>W 86.51102</u>		
SPECIES INFORMATION						
Species Code	Abundance	QE	Vchr.	Ref. ID	Individual Plant Bed Survey 	
<u>T9LA</u>	<u>3</u>	<u>1</u>	<u>0</u>			
<u>H1PA</u>	<u>3</u>	<u>1</u>	<u>0</u>			
<u>JUAM</u>	<u>1</u>	<u>0</u>	<u>0</u>			
Comments:						
REMINDER INFORMATION						
Substrate:	Marl	Canopy:	QE Code:	Reference ID:		
1 = Silt/Clay	1 = Present	1 = < 2%	0 = as defined	Unique number or		
2 = Silt w/Sand	0 = absent	2 = 2-20%	1 = Species suspected	letter to denote specific		
3 = Sand w/Silt		3 = 21-60%	2 = Genus suspected	location of a species;		
4 = Hard Clay	High Organic	4 = > 60%	3 = Unknown	referenced on attached map		
5 = Gravel/Rock	1 = Present					
6 = Sand	0 = absent					
	Overall Surface Cover	Abundance:	Voucher:			
	N = Nonrooted floating	1 = < 2%	0 = Not Taken			
	F = Floating, rooted	2 = 2-20%	1 = Taken, not varified			
	E = Emergent	3 = 21-60%	2 = Taken, varified			
	S = Submersed	4 = > 60%				

Aquatic Vegetation Plant Bed Data Sheet						Page <u>4</u> of <u>16</u>
State of Indiana Department of Natural Resources						
ORGANIZATION:				DATE: <u>8-8-06</u>		
SITE INFORMATION				SITE COORDINATES		
Plant Bed ID: <u>4</u>	Waterbody Name: <u>Griffy</u>			Center of the Bed		
Bed Size: <u>2.2</u>				Latitude: <u>N39.19756</u>		
Substrate: <u>1</u>	Waterbody ID:			Longitude: <u>W86.51278</u>		
Marl? <u>0</u>	Total # of Species <u>2</u>			Max. Lakeward Extent of Bed		
High Organic? <u>1</u>	Canopy Abundance at Site			Latitude: <u>N39.19685</u>		
S: <u>1</u> N: <u>1</u> F: <u>1</u> E: <u>1</u>				Longitude: <u>W86.51318</u>		
SPECIES INFORMATION						
Species Code	Abundance	QE	Vchr.	Ref. ID	<div style="text-align: center;"> Individual Plant Bed Survey </div>  <div style="margin-top: 20px;"> Comments: </div>	
<u>CEDE4</u>	<u>4</u>	<u>0</u>	<u>0</u>			
<u>CH?RA</u>	<u>2</u>	<u>0</u>	<u>0</u>			
REMINDER INFORMATION						
Substrate:	Marl	Canopy:		QE Code:	Reference ID:	
1 = Silt/Clay	1 = Present	1 = < 2%		0 = as defined	Unique number or	
2 = Silt w/Sand	0 = absent	2 = 2-20%		1 = Species suspe	letter to denote specific	
3 = Sand w/Silt		3 = 21-60%		2 = Genus suspected	location of a species;	
4 = Hard Clay	High Organic	4 = > 60%		3 = Unknown	referenced on attached map	
5 = Gravel/Rock	1 = Present					
6 = Sand	0 = absent					
Overall Surface Cover		Abundance:		Voucher:		
N = Nonrooted floating		1 = < 2%		0 = Not Taken		
F = Floating, rooted		2 = 2-20%		1 = Taken, not varified		
E = Emergent		3 = 21-60%		2 = Taken, varified		
S = Submersed		4 = > 60%				

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ORGANIZATION: <u>A.C.</u>				DATE: <u>8-8-06</u>	
SITE INFORMATION				SITE COORDINATES	
Plant Bed ID: <u>5</u>		Waterbody Name: <u>Griffy</u>		Center of the Bed	
Bed Size: <u>14.6</u>				Latitude: <u>N 39.19876</u>	
Substrate: <u>1</u>		Waterbody ID:		Longitude: <u>W 86.51450</u>	
Mari? <u>0</u>		Total # of Species <u>3</u>		Max. Lakeward Extent of Bed	
High Organic? <u>1</u>		Canopy Abundance at Site		Latitude: <u>N 39.19963</u>	
		S: <u>1</u>	N: <u>1</u>	F: <u>1</u>	E: <u>1</u>
				Longitude: <u>W 86.51631</u>	

[illegible]

Diagram illustrating a travel pattern within a plant bed. The pattern is shown as a series of dashed lines forming a zigzag path, with arrows indicating the direction of travel. The path starts at the bottom left, moves up and right, then down and right, then up and right, and finally down and right, ending at the bottom right. The label "Travel Pattern" points to the dashed lines, and "Plant Bed ID # 01" points to the overall shape of the bed.

5.5 ft Secch
Sago + Egrina plant
seen floating

Substrate:	Marl	Canopy:	QE Code:	Reference ID:
1 = Silt/Clay	1 = Present	1 = < 2%	0 = as defined	Unique number or
2 = Silt w/Sand	0 = absent	2 = 2-20%	1 = Species suspect	letter to denote specific
3 = Sand w/Silt		3 = 21-60%	2 = Genus suspected	location of a species;
4 = Hard Clay	High Organic	4 = > 60%	3 = Unknown	referenced on attached map
5 = Gravel/Rock	1 = Present			
6 = Sand	0 = absent			
		Abundance:	Voucher:	
	Overall Surface Cover	1 = < 2%	0 = Not Taken	
	N = Nonrooted floating	2 = 2-20%	1 = Taken, not varified	
	F = Floating, rooted	3 = 21-60%	2 = Taken, varifier	
	E = Emergent	4 = > 60%		
	S = Submersed			

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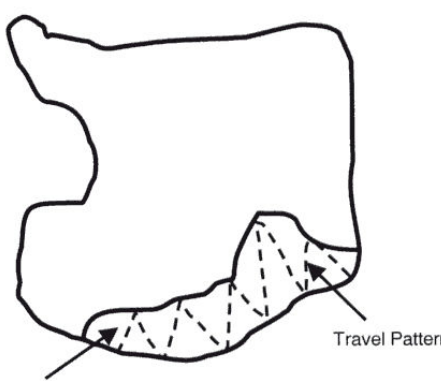
ORGANIZATION: A.C.					DATE: 8-8-06	
SITE INFORMATION					SITE COORDINATES	
Plant Bed ID: 6		Waterbody Name: Gr. ffy			Center of the Bed	
Bed Size: 1.1					Latitude: N 39.19976	
Substrate: 1		Waterbody ID:			Longitude: W 86.51354	
Marl? 0		Total # of Species 2			Max. Lakeward Extent of Bed	
High Organic? 1		Canopy Abundance at Site			Latitude: N 39.19997	
		S: 1	N: 1	F: 1	E: 1	Longitude: W 86.51404

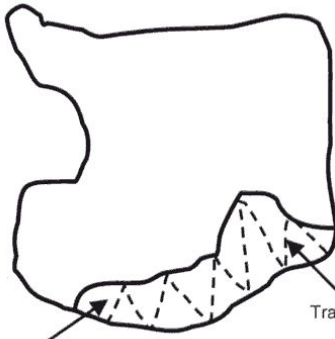
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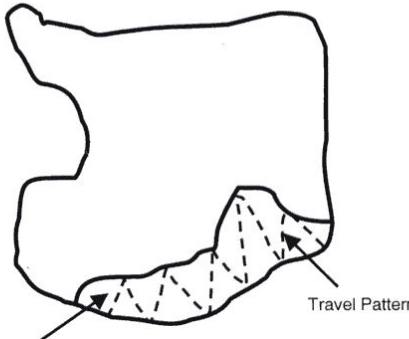
Diagram of Plant Bed ID # 01. The diagram shows an irregular shape representing the plant bed. A dashed line indicates the travel pattern, starting from the bottom left and moving towards the top right. An arrow points to the dashed line, labeled "Travel Pattern". The label "Plant Bed ID # 01" is located at the bottom left of the diagram.

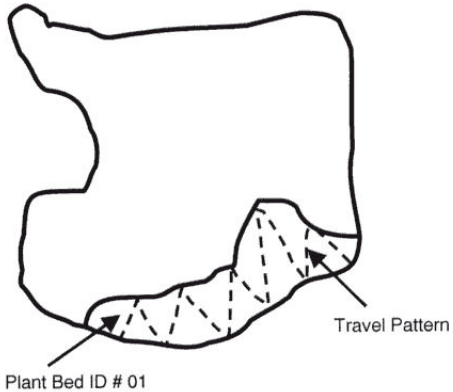
Pond across
road

Substrate:	Marl	Canopy:	QE Code:	Reference ID:
1 = Silt/Clay	1 = Present	1 = < 2%	0 = as defined	Unique number or
2 = Silt w/Sand	0 = absent	2 = 2-20%	1 = Species suspe	letter to denote specific
3 = Sand w/Silt		3 = 21-60%	2 = Genus suspected	location of a species;
4 = Hard Clay	High Organic	4 = > 60%	3 = Unknown	referenced on attached map
5 = Gravel/Rock	1 = Present			
6 = Sand	0 = absent			
		Abundance:	Voucher:	
	Overall Surface Cover	1 = < 2%	0 = Not Taken	
	N = Nonrooted floating	2 = 2-20%	1 = Taken, not varified	
	F = Floating, rooted	3 = 21-60%	2 = Taken, varified	
	E = Emergent	4 = > 60%		
	S = Submersed			

Aquatic Vegetation Plant Bed Data Sheet						Page <u>7</u> of <u>16</u>
State of Indiana Department of Natural Resources						
ORGANIZATION: <u>A.C.</u>				DATE: <u>8-8-06</u>		
SITE INFORMATION				SITE COORDINATES		
Plant Bed ID: <u>7</u>	Waterbody Name: <u>Griffy</u>			Center of the Bed		
Bed Size: <u>1.8</u>				Latitude: <u>N 39.2011</u>		
Substrate: <u>5</u>	Waterbody ID: <u>4</u>			Longitude: <u>W 86.51793</u>		
Marl? <u>0</u>	Total # of Species <u>4</u>			Max. Lakeward Extent of Bed		
High Organic? <u>0</u>	Canopy Abundance at Site			Latitude: <u>N 39.20252</u>		
S: <u>3</u> N: <u>1</u> F: <u>1</u> E: <u>1</u>				Longitude: <u>W 86.51956</u>		
SPECIES INFORMATION						
Species Code	Abundance	QE	Vchr.	Ref. ID	<div style="text-align: center;">Individual Plant Bed Survey</div> 	
<u>CH?RA</u>	<u>4</u>	<u>2</u>	<u>0</u>			
<u>JWAM</u>	<u>2</u>	<u>0</u>	<u>0</u>			
<u>LUPE</u>	<u>1</u>	<u>0</u>	<u>0</u>			
<u>CEDE4</u>	<u>1</u>	<u>0</u>	<u>0</u>			
Comments:						
REMINDER INFORMATION						
Substrate:	Marl	Canopy:	QE Code:	Reference ID:		
1 = Silt/Clay	1 = Present	1 = < 2%	0 = as defined	Unique number or		
2 = Silt w/Sand	0 = absent	2 = 2-20%	1 = Species suspe	letter to denote specific		
3 = Sand w/Silt		3 = 21-60%	2 = Genus suspected	location of a species;		
4 = Hard Clay	High Organic	4 = > 60%	3 = Unknown	referenced on attached map		
5 = Gravel/Rock	1 = Present					
6 = Sand	0 = absent					
	Overall Surface Cover	Abundance:	Voucher:			
	N = Nonrooted floating	1 = < 2%	0 = Not Taken			
	F = Floating, rooted	2 = 2-20%	1 = Taken, not varified			
	E = Emergent	3 = 21-60%	2 = Taken, varifier			
	S = Submersed	4 = > 60%				

Aquatic Vegetation Plant Bed Data Sheet						Page 2 of 16
State of Indiana Department of Natural Resources						
ORGANIZATION:				DATE: 8-8-06		
SITE INFORMATION				SITE COORDINATES		
Plant Bed ID: 8	Waterbody Name: Griffy			Center of the Bed		
Bed Size: 1.3	Waterbody ID:			Latitude: N 39.26306		
Substrate: 1				Longitude: W 86.51840		
Marl? 0	Total # of Species			Max. Lakeward Extent of Bed		
High Organic? 1	Canopy Abundance at Site			Latitude: N 39.20315		
S: 1 N: 1 F: 1 E: 1				Longitude: W 86.51915		
SPECIES INFORMATION						
Species Code	Abundance	QE	Vchr.	Ref. ID	<div style="text-align: center; padding-bottom: 10px;">Individual Plant Bed Survey</div>  <div style="text-align: right; padding-top: 10px;">Travel Pattern</div>	
CH?RA	1	2	0			
LUPE	1	0	0			
Comments:						
REMINDER INFORMATION						
Substrate:	Marl	Canopy:		QE Code:	Reference ID:	
1 = Silt/Clay	1 = Present	1 = < 2%		0 = as defined	Unique number or	
2 = Silt w/Sand	0 = absent	2 = 2-20%		1 = Species suspe	letter to denote specific	
3 = Sand w/Silt		3 = 21-60%		2 = Genus suspected	location of a species;	
4 = Hard Clay	High Organic	4 = > 60%		3 = Unknown	referenced on attached map	
5 = Gravel/Rock	1 = Present					
6 = Sand	0 = absent					
Overall Surface Cover		Abundance:		Voucher:		
N = Nonrooted floating		1 = < 2%		0 = Not Taken		
F = Floating, rooted		2 = 2-20%		1 = Taken, not varified		
E = Emergent		3 = 21-60%		2 = Taken, varified		
S = Submersed		4 = > 60%				

Aquatic Vegetation Plant Bed Data Sheet						Page <u>9</u> of <u>16</u>	
State of Indiana Department of Natural Resources							
ORGANIZATION: <u>A.C.</u>				DATE: <u>8-8-06</u>			
SITE INFORMATION				SITE COORDINATES			
Plant Bed ID: <u>9</u>	Waterbody Name: <u>Griffy</u>			Center of the Bed			
Bed Size: <u>0.1</u>				Latitude: <u>N 39.20320</u>			
Substrate: <u>5</u>	Waterbody ID:			Longitude: <u>W 86.51948</u>			
Marl? <u>0</u>	Total # of Species <u>4</u>			Max. Lakeward Extent of Bed			
High Organic? <u>0</u>	Canopy Abundance at Site			Latitude: <u>N 39.20320</u>			
	S: <u>1</u>	N: <u>1</u>	F: <u>1</u>	E: <u>1</u>	Longitude: <u>W 86.51976</u>		
SPECIES INFORMATION							
Species Code	Abundance	QE	Vchr.	Ref. ID	Individual Plant Bed Survey		
<u>CH?RA</u>	<u>3</u>	<u>0</u>	<u>0</u>				
<u>JWAM</u>	<u>1</u>	<u>0</u>	<u>0</u>				
<u>LUPE</u>	<u>1</u>	<u>0</u>	<u>0</u>				
<u>EGDE</u>	<u>1</u>	<u>0</u>	<u>0</u>				
					Comments: <u>Egeria Brown</u> <u>Little Green</u>		
REMINDER INFORMATION							
Substrate:	Marl		Canopy:				QE Code:
1 = Silt/Clay	1 = Present		1 = < 2%				0 = as defined
2 = Silt w/Sand	0 = absent		2 = 2-20%				1 = Species suspe
3 = Sand w/Silt			3 = 21-60%				2 = Genus suspected
4 = Hard Clay	High Organic		4 = > 60%				3 = Unknown
5 = Gravel/Rock	1 = Present						
6 = Sand	0 = absent						
Overall Surface Cover		Abundance:		Voucher:			
N = Nonrooted floating		1 = < 2%		0 = Not Taken			
F = Floating, rooted		2 = 2-20%		1 = Taken, not varified			
E = Emergent		3 = 21-60%		2 = Taken, varifier			
S = Submersed		4 = > 60%					

Aquatic Vegetation Plant Bed Data Sheet						Page <u>10</u> of <u>16</u>
State of Indiana Department of Natural Resources						
ORGANIZATION: <u>A.C.</u>				DATE: <u>8-8-06</u>		
SITE INFORMATION				SITE COORDINATES		
Plant Bed ID: <u>10</u>	Waterbody Name: <u>Griffy</u>			Center of the Bed		
Bed Size: <u>1.1</u>	Waterbody ID: <u>Griffy</u>			Latitude: <u>N 39.20448</u>		
Substrate: <u>5</u>	Total # of Species: <u>4</u>			Longitude: <u>W 86.52131</u>		
Marl? <u>0</u>	High Organic? <u>0</u>			Max. Lakeward Extent of Bed		
Canopy Abundance at Site				Latitude: <u>N 39.20450</u>		
S: <u>1</u> N: <u>1</u> F: <u>1</u> E: <u>1</u>				Longitude: <u>W 86.52157</u>		
SPECIES INFORMATION						
Species Code	Abundance	QE	Vchr.	Ref. ID	<div style="text-align: center;">Individual Plant Bed Survey</div> 	
<u>CH?RA</u>	<u>4</u>	<u>2</u>	<u>0</u>			
<u>CEDE4</u>	<u>1</u>	<u>0</u>	<u>0</u>			
<u>JUAM</u>	<u>1</u>	<u>0</u>	<u>0</u>			
<u>LUPE</u>	<u>1</u>	<u>0</u>	<u>0</u>			
Comments:						
REMINDER INFORMATION						
Substrate:	Marl	Canopy:	QE Code:	Reference ID:		
1 = Silt/Clay	1 = Present	1 = < 2%	0 = as defined	Unique number or		
2 = Silt w/Sand	0 = absent	2 = 2-20%	1 = Species suspe	letter to denote specific		
3 = Sand w/Silt		3 = 21-60%	2 = Genus suspected	location of a species;		
4 = Hard Clay	High Organic	4 = > 60%	3 = Unknown	referenced on attached map		
5 = Gravel/Rock	1 = Present					
6 = Sand	0 = absent					
	Overall Surface Cover	Abundance:	Voucher:			
	N = Nonrooted floating	1 = < 2%	0 = Not Taken			
	F = Floating, rooted	2 = 2-20%	1 = Taken, not varified			
	E = Emergent	3 = 21-60%	2 = Taken, varifier			
	S = Submersed	4 = > 60%				

AQUATIC CONTROL

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ORGANIZATION: AC					DATE: 8-8-02	
SITE INFORMATION					SITE COORDINATES	
Plant Bed ID: 12	Waterbody Name: Griffy				Center of the Bed	
Bed Size: 0.1					Latitude: N 39.20546	
Substrate: 5	Waterbody ID:				Longitude: W 86.52649	
Marl? 0	Total # of Species 4				Max. Lakeward Extent of Bed	
High Organic? 0	Canopy Abundance at Site				Latitude: N 39.20558	
	S: 1	N: 1	F: 1	E: 1	Longitude: W 86.52649	

[illegible]

Diagram of Plant Bed ID # 01. The diagram shows an irregular shape representing the plant bed. A dashed line indicates the travel pattern, starting from the bottom left and moving towards the top right. An arrow points to the dashed line, labeled "Travel Pattern". The label "Plant Bed ID # 01" is located at the bottom left of the diagram.

Brown Egeria

Substrate:		Canopy:	QE Code:	Reference ID:
1 = Silt/Clay	1 = Present	1 = < 2%	0 = as defined	Unique number or
2 = Silt w/Sand	0 = absent	2 = 2-20%	1 = Species suspe	letter to denote specific
3 = Sand w/Silt		3 = 21-60%	2 = Genus suspected	location of a species;
4 = Hard Clay	High Organic	4 = > 60%	3 = Unknown	referenced on attached map
5 = Gravel/Rock	1 = Present			
6 = Sand	0 = absent			
		Abundance:	Voucher:	
	Overall Surface Cover	1 = < 2%	0 = Not Taken	
	N = Nonrooted floating	2 = 2-20%	1 = Taken, not varified	
	F = Floating, rooted	3 = 21-60%	2 = Taken, varifier	
	E = Emergent	4 = > 60%		
	S = Submersed			

Aquatic Vegetation Plant Bed Data Sheet

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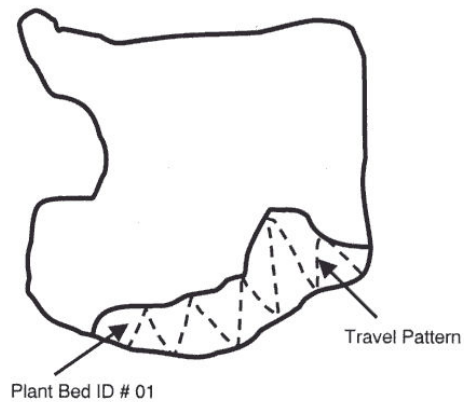
State of Indiana Department of Natural Resources

ORGANIZATION: A.C.					DATE: 8-8-06	
SITE INFORMATION					SITE COORDINATES	
Plant Bed ID: 13		Waterbody Name: Griffy			Center of the Bed	
Bed Size: 0.95					Latitude: N 39.26343 20003	
Substrate: 1		Waterbody ID:			Longitude: W 86.52341 52653	
Marl? 0		Total # of Species 3			Max. Lakeward Extent of Bed	
High Organic? 1		Canopy Abundance at Site			Latitude: N 39.26379 20046	
S: 1		N: 1		F: 1	E: 4	Longitude: W 86.52370 52671

SPECIES INFORMATION

[illegible]

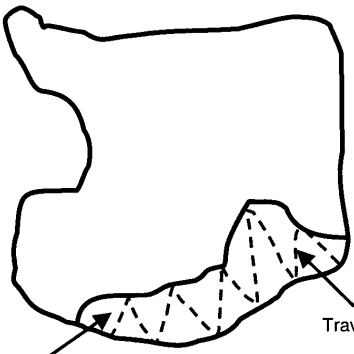
Individual Plant Bed Survey

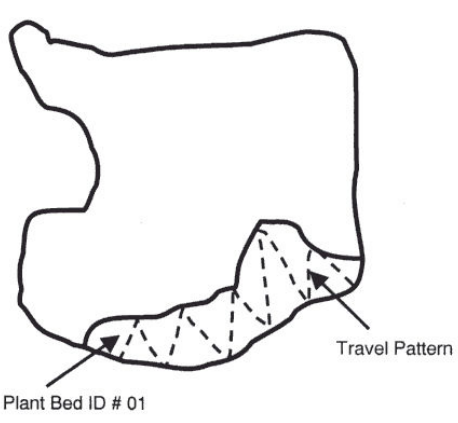


Comments:

REMINDER INFORMATION

Substrate:	Mari	Canopy:	QE Code:	Reference ID:
1 = Silt/Clay	1 = Present	1 = < 2%	0 = as defined	Unique number or
2 = Silt w/Sand	0 = absent	2 = 2-20%	1 = Species suspe	letter to denote specific
3 = Sand w/Silt		3 = 21-60%	2 = Genus suspected	location of a species;
4 = Hard Clay	High Organic	4 = > 60%	3 = Unknown	referenced on attached map
5 = Gravel/Rock	1 = Present			
6 = Sand	0 = absent			
		Abundance:	Voucher:	
Overall Surface Cover		1 = < 2%	0 = Not Taken	
N = Nonrooted floating		2 = 2-20%	1 = Taken, not varified	
F = Floating, rooted		3 = 21-60%	2 = Taken, varifier	
E = Emergent		4 = > 60%		
S = Submersed				

Aquatic Vegetation Plant Bed Data Sheet						Page <u>14</u> of <u>16</u>
State of Indiana Department of Natural Resources						
ORGANIZATION: <u>A.C.</u>				DATE: <u>8-8-06</u>		
SITE INFORMATION				SITE COORDINATES		
Plant Bed ID: <u>14</u>	Waterbody Name: <u>Griffy</u>			Center of the Bed		
Bed Size: <u>0.9</u>				Latitude: <u>N 39 20363</u>		
Substrate: <u>5</u>				Longitude: <u>W 86 52341</u>		
Marl? <u>0</u>	Total # of Species			Max. Lakeward Extent of Bed		
High Organic? <u>0</u>	Canopy Abundance at Site			Latitude: <u>N 39 20379</u>		
S: <u>3</u> N: <u>1</u> F: <u>1</u> E: <u>1</u>				Longitude: <u>W 86 52370</u>		
SPECIES INFORMATION						
Species Code	Abundance	QE	Vchr.	Ref. ID	<div style="text-align: center;"> <p>Individual Plant Bed Survey</p>  </div>	
<u>CH2RA</u>	<u>4</u>	<u>0</u>	<u>0</u>			
<u>JUAM</u>	<u>1</u>	<u>0</u>	<u>0</u>			
					Comments:	
REMINDER INFORMATION						
Substrate:	Marl	Canopy:		QE Code:	Reference ID:	
1 = Silt/Clay	1 = Present	1 = < 2%		0 = as defined	Unique number or	
2 = Silt w/Sand	0 = absent	2 = 2-20%		1 = Species suspe	letter to denote specific	
3 = Sand w/Silt		3 = 21-60%		2 = Genus suspected	location of a species;	
4 = Hard Clay	High Organic	4 = > 60%		3 = Unknown	referenced on attached map	
5 = Gravel/Rock	1 = Present					
6 = Sand	0 = absent					
Overall Surface Cover		Abundance:		Voucher:		
N = Nonrooted floating		1 = < 2%		0 = Not Taken		
F = Floating, rooted		2 = 2-20%		1 = Taken, not varified		
E = Emergent		3 = 21-60%		2 = Taken, varifier		
S = Submersed		4 = > 60%				

Aquatic Vegetation Plant Bed Data Sheet						Page 15 of 16	
State of Indiana Department of Natural Resources							
ORGANIZATION: A.C.				DATE: 8-8-06			
SITE INFORMATION				SITE COORDINATES			
Plant Bed ID: 15	Waterbody Name: Griffy			Center of the Bed			
Bed Size: 2.2				Latitude: N 39.1994			
Substrate: 5	Waterbody ID:			Longitude: W 86.51967			
Marl? 0	Total # of Species 3			Max. Lakeward Extent of Bed			
High Organic? 0	Canopy Abundance at Site			Latitude: N 39.20243			
S: 1 N: 1 F: 1 E: 1				Longitude: W 86.52222			
SPECIES INFORMATION							
Species Code	Abundance	QE	Vchr.	Ref. ID	<div style="text-align: center;">Individual Plant Bed Survey</div> 		
CH?RA	1	2	0				
CEDE4	1	0	0				
JUAM	1	0	0				
Comments:					<div style="text-align: center;">Sparse Rock Deep</div>		
REMINDER INFORMATION					<div style="text-align: center;">Reference ID: Unique number or letter to denote specific location of a species; referenced on attached map</div>		
Substrate:	Marl	Canopy:		QE Code:			
1 = Silt/Clay	1 = Present	1 = < 2%		0 = as defined			
2 = Silt w/Sand	0 = absent	2 = 2-20%		1 = Species suscep			
3 = Sand w/Silt		3 = 21-60%		2 = Genus suspected			
4 = Hard Clay	High Organic	4 = > 60%		3 = Unknown			
5 = Gravel/Rock	1 = Present	Abundance:		Voucher:			
6 = Sand	0 = absent						
Overall Surface Cover							
N = Nonrooted floating							
F = Floating, rooted		2 = 2-20%		1 = Taken, not varified			
E = Emergent		3 = 21-60%		2 = Taken, varifier			
S = Submersed		4 = > 60%					

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ORGANIZATION: A.C.					DATE: 8-8-06	
SITE INFORMATION					SITE COORDINATES	
Plant Bed ID: 16		Waterbody Name: Griffy			Center of the Bed	
Bed Size: 1,2					Latitude: N39.19783	
Substrate: 5		Waterbody ID:			Longitude: W86.51581	
Marl? 0		Total # of Species 3			Max. Lakeward Extent of Bed	
High Organic? 0		Canopy Abundance at Site			Latitude: N39.19847	
S: 1		N: 1		F: 1	E: 1	Longitude: W86.51536

[illegible]

Diagram of Plant Bed ID #01. The diagram shows an irregular shape representing the plant bed. A dashed line indicates the travel pattern, starting from the bottom left and moving towards the top right. Arrows point to the dashed line and the label "Travel Pattern".

only 1 healthy plant

Substrate:	Mari	Canopy:	QE Code:	Reference ID:
1 = Silt/Clay	1 = Present	1 = < 2%	0 = as defined	Unique number or
2 = Silt w/Sand	0 = absent	2 = 2-20%	1 = Species suspe	letter to denote specific
3 = Sand w/Silt		3 = 21-60%	2 = Genus suspected	location of a species;
4 = Hard Clay	High Organic	4 = > 60%	3 = Unknown	referenced on attached map
5 = Gravel/Rock	1 = Present			
6 = Sand	0 = absent			
		Abundance:	Voucher:	
	Overall Surface Cover	1 = < 2%	0 = Not Taken	
	N = Nonrooted floating	2 = 2-20%	1 = Taken, not varified	
	F = Floating, rooted	3 = 21-60%	2 = Taken, varifier	
	E = Emergent	4 = > 60%		
	S = Submersed			

Tier II Data

Plant Database

Lake	Date	Latitude	Longitude	Design	Site	Depth	RAKE	EGDE	CEDE4	CH?AR	ZAPA
Griffy	8/8/06	39.19797	-86.513064		1	5.0	3		3	1	
Griffy	8/8/06	39.19749	-86.511582		2	2.0	3			3	
Griffy	8/8/06	39.19685	-86.511082		3	2.0	0				
Griffy	8/8/06	39.19702	-86.512723		4	3.0	1			1	
Griffy	8/8/06	39.19698	-86.513861		5	6.0	0				
Griffy	8/8/06	39.19767	-86.514557		6	6.0	0				
Griffy	8/8/06	39.19812	-86.515647		7	7.0	1	1	1		
Griffy	8/8/06	39.19901	-86.515855		8	10.0	1	1	1		
Griffy	8/8/06	39.1996	-86.516325		9	11.0	1		1		
Griffy	8/8/06	39.19916	-86.51434		10	9.0	1		1		
Griffy	8/8/06	39.20023	-86.514712		11	3.0	1		1		
Griffy	8/8/06	39.20019	-86.516523		12	13.0	0				
Griffy	8/8/06	39.20088	-86.517545		13	15.0	1		1		
Griffy	8/8/06	39.20146	-86.518813		14	19.0	0				
Griffy	8/8/06	39.20222	-86.519549		15	12.0	1		1		
Griffy	8/8/06	39.20276	-86.518782		16	4.0	0				
Griffy	8/8/06	39.20319	-86.518164		17	2.0	1		1	1	
Griffy	8/8/06	39.20319	-86.51918		18	10.0	1	1			
Griffy	8/8/06	39.20371	-86.520538		19	15.0	0				
Griffy	8/8/06	39.20441	-86.521167		20	11.0	1	1	1		
Griffy	8/8/06	39.20509	-86.521964		21	9.0	3		3		1
Griffy	8/8/06	39.20583	-86.522645		22	13.0	1	1	1	1	
Griffy	8/8/06	39.20631	-86.522309		23	4.0	0				
Griffy	8/8/06	39.20582	-86.523574		24	16.0	1		1		
Griffy	8/8/06	39.20546	-86.524627		25	11.0	1		1		
Griffy	8/8/06	39.20551	-86.525899		26	10.0	0				
Griffy	8/8/06	39.20556	-86.526656		27	8.0	1		1		
Griffy	8/8/06	39.20523	-86.527157		28	19.0	0				
Griffy	8/8/06	39.20472	-86.527915		29	18.0	1		1		
Griffy	8/8/06	39.20431	-86.528654		30	12.0	0				
Griffy	8/8/06	39.20344	-86.528263		31	3.0	0				
Griffy	8/8/06	39.20269	-86.527493		32	16.0	0				
Griffy	8/8/06	39.20207	-86.527595		33	10.0	1		1		
Griffy	8/8/06	39.20109	-86.527387		34	4.0	0				
Griffy	8/8/06	39.20052	-86.526663		35	3.0	0				
Griffy	8/8/06	39.20157	-86.52707		36	11.0	0				
Griffy	8/8/06	39.20257	-86.526828		37	9.0	1		1		
Griffy	8/8/06	39.20313	-86.526318		38	16.0	0				
Griffy	8/8/06	39.20341	-86.525412		39	9.0	1		1		
Griffy	8/8/06	39.20377	-86.524187		40	16.0	0				
Griffy	8/8/06	39.20359	-86.523263		41	2.0	0				
Griffy	8/8/06	39.20325	-86.522479		42	10.0	0				
Griffy	8/8/06	39.2026	-86.522241		43	16.0	0				
Griffy	8/8/06	39.20114	-86.521939		44	4.0	0				
Griffy	8/8/06	39.20044	-86.520714		45	12.0	0				
Griffy	8/8/06	39.20004	-86.519881		46	17.0	0				
Griffy	8/8/06	39.19971	-86.518735		47	10.0	0				
Griffy	8/8/06	39.19942	-86.517907		48	12.0	0				
Griffy	8/8/06	39.19888	-86.517293		49	3.0	0				
Griffy	8/8/06	39.19887	-86.51648		50	16.0	0				

Aquatic Vegetation Random Sampling

Waterbody Cover Sheet

Organization Name:

Aquatic Control

Waterbody Name:

Griffy

Lake ID:

County:

Monroe

Date:

8-8-06

Habitat Stratum:

IR

Ave. Lake

16

Depth (ft):

Lake Level:

None

GPS Metadata

Crew

Leader:

N. Long

Nad27

D

3M

Datum:

Zone:

Accuracy:

Recorder:

B. Isaacs

Method:

D

Secchi Depth (ft):

5.5

Total # of Sites
Surveyed:

50

Total # of
Species:

4

Littoral Zone Size (acres):



Measured

42.5



Estimated

Littoral Zone Max. Depth (ft):



Measured

18.0



Estimate (historical Secchi)



Estimated (current Secchi)

Notable Conditions:

APPENDIX A

Algae Pres. 2% of site

Submersed Aquatic Plant Survey Form

Page 1 of 2

WATER BODY NAME <u>Griffy</u>				SECCHI <u>5.5</u>					
COUNTY <u>Monroe</u>				MAX PLANT DEPTH <u>10</u>					
DATE <u>8-8-06</u>				WEATHER					
CREW LEADER <u>Nate Long</u>				COMMENTS					
RECORDER <u>Doug Keller</u>									
				Rake score (1-5), observed only (9), algae present (p)					
				Use acronyms for species, V1, V2...for voucher codes					
				Note					
				ZAP Species Code					
Site	Northing	Easting	Depth	All	CH?RA	CO?EY	EGDE	UNEDN	Algae
1			5	3	1	3			
2			2	3	3				
3			2	NP					P
4			3	1	1				
5			6	NP					
6			6	NP					
7			7	1		1	1		
8			10	1		1	1		
9			11	1		1			
10			9	1		1			
11			3	1		1			
12			13	NP					
13			15	1		1			
14			19	NP					
15			12	1		1			
16			4	NP					
17			2	1	1	1			
18			10	1			1		
19			15	NP					
20			11	1		1	1		
21			9	3		3		1	
22			13	1	1	1	1		
23			4	NP					
24			16	1		1			
25			11	1		1			
26			10	NP					
27			8	1		1			
28			19	NP					
29			18	1		1			
30			12	NP					
31			3	NP					
32			16	NP					
Other plant species observed at lake									
water willow, primrose, cattail, swamp rose mallow, dodder plant, sage, flwm									

AQUATIC CONTROL